Battling Bridal Creeper in coastal dunes – a community approach

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Abstract
This paper examines whether a community-based approach to the biological control (biocontrol) of Bridal Creeper *Asparagus asparagoides* L. Druce can be effective in reducing the impact of the weed. Bridal Creeper is a serious threat to native vegetation on Victoria's Bellarine Peninsula. In many situations, such as occurs at Buckley Park Foreshore Reserve, Bridal Creeper can be difficult to control without serious off-target damage. Implementing the biocontrol of Bridal Creeper is therefore seen as a priority. A model for a community-based biocontrol program was adopted on the Peninsula to facilitate the spread and impact of biocontrol agents. The program has required a close collaboration between researchers, land managers, and community groups, including local schools. As a result of the program biocontrol agents have been released at 46 sites on the Bellarine peninsula. Two agents in particular are now spreading and causing visible damage to bridal creeper infestations. The program has demonstrated the important role biocontrol can play in the integrated management of a widespread environmental weed, and provides a strong basis for future collaboration at a local level in weed management issues. (*The Victorian Naturalist* **124** (2), 2007, 106-109)

Introduction

The Bellarine Peninsula is located adjacent to Port Phillip Bay, Victoria. A major threat to native vegetation in the area is the invasive introduced plant Bridal Creeper *Asparagus asparagoides* L. Druce, listed by the Commonwealth government as one of twenty Weeds of National Significance (WoNS) (Thorpe and Lynch 2000). Aboveground parts of the plant can smother native vegetation during the autumn-spring growing season. Although the aboveground parts of the plant senesce during summer, dense underground mats comprising rhizomes and storage tubers may prevent seedling recruitment throughout the year (Raymond 1999). Community groups and local schools on the Bellarine Peninsula have combined with government agencies and land managers to facilitate the implementation of biological control. This paper examines the effectiveness of the collaboration in implementing biocontrol of Bridal Creeper, highlighting Buckley Park Foreshore Reserve as an example of a significant Bellarine Peninsula site threatened by the weed.

Buckley Park Foreshore Reserve

According to the draft Buckley Park Coastal Management Plan (CDA and WE 2005):

> Buckley Park Foreshore Reserve is a unique location consisting of an extensive sand dune and coastal vegetation system with populations of vegetation communities with rare and vulnerable conservation status within the Geelong/Barwon Coast Region and Victoria. The reserve is also rich in both European and Indigenous Australian history further adding to the value of the reserve.

The reserve occupies approximately 5 kms of foreshore and coastal dunes between the townships of Ocean Grove and Point Lonsdale, Victoria, and is managed by the City of Greater Geelong, on behalf of the Department of Sustainability and Environment. Adjacent land managers include the Barwon Coast Committee of Management and Borough of Queenscliff, as well as numerous private landowners (C.D.A. and W.E. 2005). The reserve comprises two Ecological Vegetation Classes (EVCs) in the Otway Plain Bioregion: (i) Coastal Dune Scrub/Coastal Dune Grassland Mosaic (EVC 1) and (ii) Coastal Alkaline Scrub/Calcarenite Dune Woodland (EVC 858). The draft Buckley Park Coastal Management Plan (C.D.A. and W.E. 2005) lists five significant plant communities in the reserve, each of which is threatened by invasive plants. Bridal

Creeper is the most prevalent invasive plant in four of the five listed plant communities.

Managing Bridal Creeper on the Bellarine Peninsula

Controlling Bridal Creeper in areas such as Buckley Park Foreshore Reserve is difficult as manual removal of large infestations is extremely labour intensive, and herbicide controls have potential for serious off-target damage. Even when infestations are controlled, tuber mats may persist; Turner *et al.* (2006), for example, estimated that 50 years after Bridal Creeper is killed up to 35% of the below-ground biomass of the plant may remain. Biological control agents such as the rust fungus *Puccinia myrsiphylla* (Thuem.) may act as a nutrient sink, and help to deplete tuber reserves (Morin *et al.* 2006). Biological control is, therefore, seen as an important part of the integrated management of bridal creeper.

Biological control of Bridal Creeper in Australia

Research into the biocontrol of Bridal Creeper was initiated in the late 1980s (Scott and Kleinjan 1991). One pathogen and two insects have been approved for release in Australia since 1999 (Morin *et al.* 2006). They are, in order of approval: (i) the leafhopper *Zygina* sp. in 1999, (ii) the rust fungus *P. myrsiphylla* in 2000, and (iii) the leaf beetle *Crioceris* sp. in 2002. Approval to release these biocontrol agents followed extensive testing by CSIRO that demonstrated the agents are specific to bridal creeper (Morin *et al.* 2006). In Victoria, the Department of Primary Industries (DPI) has conducted widespread releases of the leaf hopper and rust fungus across the State (Morin *et al.* 2006). The leafhopper and rust fungus have established at most release sites and are dispersing naturally (Holland-Clift and Kwong 2004; unpubl. data). The first release in Victoria of the leaf beetle occurred at Coolart in March, 2005, and it has been released subsequently at just eight locations in the State (Morin *et al.* 2006; unpubl. data).

Implementing biological control of Bridal Creeper on the Bellarine Peninsula

Once a biocontrol agent is approved for release in Australia, there is an opportunity for research agencies to work closely with land managers and community groups to maximise the impact of biocontrol. Holland-Clift and Kwong (2004) proposed a model for a community-based biocontrol program with clearly defined research and extension requirements, and a phased approach to the development and delivery of biocontrol. This is the model largely adopted on the Bellarine Peninsula. As a result, at least 34 leafhopper releases, and 11 rust fungus releases now have been recorded on the Bellarine Peninsula up to 2006 (Longmore 2005, unpubl. data). There has been only one release of the leaf beetle on the Bellarine Peninsula, at Edwards Point. However, establishment at that site is not yet confirmed. The model proposed by Holland-Clift and Kwong (2004) comprises the following phases:

1. Selecting sites for biocontrol

Local knowledge is necessary to select sites suitable for biocontrol and to ensure biocontrol is integrated with local weed management strategies. This works best where biocontrol researchers work closely with local groups and land managers to provide guidance and advise on site selection (Holland-Clift and Kwong 2004). In the case of Buckley Park, local knowledge of factors such as the severity of the Bridal Creeper infestation, potential for off-target herbicide damage, and access difficulties, led to the reserve being identified as a priority for biocontrol.

2. Releasing biocontrol agents

Training and extension activities are essential in the early stages of implementing biocontrol. This ensures local groups and land managers acquire the skills and knowledge to continue, and even expand, programs once they commence. On the Bellarine Peninsula the support of DPI officers was critical for the subsequent success of the biocontrol program. For example, the initial releases of leafhoppers and rust fungus at Buckley Park Foreshore Reserve were made by DPI officers to maximise the likelihood of establishment. However, the opportunity was taken to involve the land manager, community group representatives, and school groups (through DPI's Weed Warriors school program). This involvement included on-site

demonstrations and participation in release techniques, discussion of agent and weed biology, and training in methods to collect and redistribute the agent once it became established.

3. Monitoring release sites
Once agents become widespread it is often difficult for DPI officers to adequately monitor the establishment, spread, and impact of biocontrol agents at all release sites. Community involvement in monitoring sites is therefore important, but has limitations. Community groups should not be asked to collect detailed technical data, as the demands on time may be unrealistic and the quality of the data may vary considerably (Holland-Clift and Kwong 2004). However, community groups on the Bellarine Peninsula have made a valuable contribution by monitoring agent establishment and spread using simple measures developed in collaboration with researchers. In Buckley Park Foreshore Reserve, an ongoing collaboration between the City of Greater Geelong, Barwon Coast Committee of Management, Swan Bay Integrated Catchment Management Committee, and volunteers from the Friends of Buckley Park, has allowed quite detailed data on agent establishment and spread to be collected over several years.

4. Redistributing biocontrol agents once they are established
In their case study, Holland-Clift and Kwong (2004) found 100% establishment of biocontrol agents at new sites when redistribution occurred from a nearby established site, and was accompanied by training and demonstration of collection and release techniques. Holland-Clift and Kwong (2004) concluded it is this phase where community groups, with proper scientific and technical support, can make the greatest impact in a biocontrol program. They stressed though that 'some element of community participation throughout the previous three phases also is necessary in order to select appropriate sites and to refine release and monitoring protocols relevant to the community members' skills and knowledge' (Holland-Clift and Kwong 2004). In this way a compromise can be reached between: (i) the research agency's desire to have trained biocontrol officers conducting and monitoring releases; (ii) the requirement to conduct as many successful releases as possible over a wide area, usually within a specified funding period; and (iii) the need to gain support for biocontrol from land managers and the broader community.

Buckley Park Foreshore Reserve provides an example of all four phases being successfully implemented, with the reserve now being used for biocontrol demonstrations and training, and as a source of rust fungus and leafhoppers for redistribution to new sites. In addition, a new technique for the widespread release of rust fungus was trialled in three areas on the Peninsula, including Buckley Park Foreshore Reserve, in 2006. This new method, called spore-water (a mixture of rust fungus spores and rainwater) allows land managers to inoculate large areas of bridal creeper using conventional spray equipment (Overton and Overton 2006), including aerial application equipment (Fig. 1). Aerial application of the rust fungus may be useful particularly for infestations that are difficult to access from the ground, such as occurs in much of Buckley Park Foreshore Reserve.

In addition to recorded release sites, there are likely to be more releases by members of the local community that have not been recorded. The CSIRO, for example, maintains an interactive web-site that allows the general public to locate release sites in their area (www.ento.csiro.au/weeds/bridal creeper/). This web-site and others (i.e. www.weeds.org.au/WoNS/bridalcreeper/,

Fig. 1. Helicopter application of 'spore-water' at Buckley Park Foreshore Reserve, September 2006. Photo: Greg Lefoe.

www.dpi.vic.gov.au, and www.weeds.crc.org.au) also provide detailed information on Bridal Creeper management and biological control.

Conclusion

The model for community involvement adopted on the Bellarine Peninsula has enabled many more biocontrol releases to be conducted against Bridal Creeper than would have been possible if DPI were acting with limited collaboration. The extent of the releases, and the success of the agents in establishing and spreading from release sites, have provided a positive experience of biocontrol for the individuals, groups, and schools involved. The leafhopper and rust fungus, for example, are now causing visible damage to Bridal Creeper on the Bellarine Peninsula. The program has demonstrated the important role biocontrol can play in the integrated management of widespread environmental weeds, and provides a strong basis for future collaboration at a local level in weed management issues.

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One Hundred and Twenty Years Ago

THE LOCUST PLAGUE.

A CORRESPONDENT at Murtoa, in the Wimmera district, forwards the following notes on this subject:–

"They appear to be a bit dainty in their tastes, as they ate all the leaves off the 'Scotch thistles,' but would not touch the so-called 'sow thistles,' which is somewhat fortunate, as stock are very fond of the latter. In passing through the crops they took the flag off the wheat, and all the wild oats and wheat, so that in several places there is nothing left but the ears of wheat on the tops of bare stems. they cut off a few ears of wheat, but they were in all cases those of shorter and later straws; the others appear to have been too hard for them..

From *The Victorian Naturalist* **3** p. 131, February 1887.